

MEMORANDUM OF UNDERSTANDING

BETWEEN THE

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
OF THE UNITED STATES OF AMERICA**

AND THE

ITALIAN SPACE AGENCY

CONCERNING THE

EUROPEAN SPACE AGENCY PLANCK MISSION

Preamble

The National Aeronautics and Space Administration of the United States of America (hereinafter referred to as "NASA") and

The Italian Space Agency (hereinafter referred to as "ASI"),

Collectively hereinafter referred to as "the Parties":

CONSIDERING that ASI was selected by the European Space Agency (ESA) to participate in the effort to provide a Low-Frequency Instrument (LFI) for the Planck mission;

CONSIDERING that NASA has shown interest in joining with ASI as a participant in the development and operation of the LFI for the ESA Planck mission;

RECALLING the interim agreement of March 29, 2001, between NASA and ASI, addressing an interest to pursue activities together on the Planck mission;

HAVE AGREED as follows:

Article 1 - Scope

- 1.1 This Memorandum of Understanding (MOU) defines the responsibilities, ways, and means, as well as the terms and conditions, by which the cooperation between the Parties shall be conducted for their combined role in the Planck mission.

Article 2 - The Planck Mission

- 2.1 ESA's Planck mission is intended to image the temperature and polarization anisotropies of Cosmic Microwave Background (CMB) radiation with an unprecedented combination of sensitivity, angular resolution, and frequency coverage. Planck is designed to make precise determinations of the fundamental parameters which define the cosmological constant, the Hubble constant, and the neutrino content of the universe.
- 2.2 The mission is planned for launch no earlier than October 31, 2008, aboard an Ariane V launch vehicle. It will be co-manifested with the ESA Herschel mission. Planck will operate in a nominal L2 Lissajous orbit for a nominal mission lifetime of two years.

Article 3 - Scientific Investigations

- 3.1 Planck is expected to significantly increase our understanding of the universe during its planned two-year nominal mission.
- 3.2 The primary Planck science instruments are the LFI and the High-Frequency Instrument (HFI).

Article 4 - Programmatic Responsibilities of ASI

ASI, supported by the Istituto Nazionale di Astro Fisica (INAF), shall use reasonable efforts to fulfill the responsibilities below:

- 4.1 Design, develop, and verify the LFI for integration with the HFI.
- 4.2 Oversee and be responsible for the technical contributions of all the European Co- investigators (Co-Is) of LFI.
- 4.3 Deliver the LFI to ESA and support integration into the ESA-provided Planck spacecraft.
- 4.4 Represent the LFI to ESA and provide the required ESA reporting documents and reviews.
- 4.5 Manage activities at the LFI Data Processing Center and provide hardware and software maintenance for the Center.

Article 5 - Programmatic Responsibilities of NASA

NASA, supported by the Jet Propulsion Laboratory (JPL) and other U.S. organizations, shall use reasonable efforts to fulfill the responsibilities below:

- 5.1 Support the participation of NASA-sponsored science team members in all phases of the mission.
- 5.2 Provide the following data/components of a common, fully redundant hydrogen sorption cryocooler for the Planck instruments (both the LFI and the HFI):
 - a. The test reports on the Elegant Breadboard (EBB) preflight cooler.
 - b. A cryogenic qualification model piping assembly and cold end (a subsystem of the cryocooler).
 - c. The flight model cooler, excluding electronics.
 - d. The redundant flight model cooler, excluding electronics.
- 5.3 Support LFI in operating the sorption cooler during integration and test activities, launch, commissioning, and mission operations.
- 5.4 Provide data analysis support and software support to the LFI Data Processing Center.

Article 6 - Rights in and Distribution of Scientific Data

- 6.1 Planck mission investigators will share Planck mission data in accordance with the Planck Science Management Plan (ESA/SPC/(2004)10) and, in particular, with chapter 5.1.1 (Delivery Schedule of Scientific Data Products) and chapter 5.2 (Scientific Data Rights and Publication Data Policy).

Article 7 - Program and Project Management

This article describes general management and organizational responsibilities. Each Party is responsible for the management of its activities as identified in Articles 4 and 5 above.

- 7.1 ESA has established a Planck Project Office at the European Science and Technology Research Center (ESTEC) in The Netherlands. The Project Office is headed by the ESA Planck Project Manager who, on behalf of the ESA Director of Science, is responsible for the overall management and implementation of the Planck mission.
- 7.2 The Planck Project Office is responsible for the design, fabrication, and launch of the Planck mission, including its scientific instruments. It is also responsible for the flight operations of the Planck mission throughout all mission phases.
- 7.3 The ASI Headquarters Observation of the Universe is responsible for the LFI hardware development and for overall programmatic and science management of the ASI-sponsored astrophysics activities. ASI has designated a Planck Program Manager and Planck Program Scientist to manage the ASI contributions to Planck. The Program Manager is also the principal point of contact for ASI in the performance of this MOU.
- 7.4 NASA has named a Planck Program Executive within the Office of Space Science at NASA Headquarters who is responsible for NASA's overall participation in the Planck mission. This responsibility includes the implementation of policies and management oversight of the Planck-related activities funded by NASA to ensure accomplishment of the mission objectives. The Program Executive is also the principal point of contact for NASA in the performance of this MOU.
- 7.5 NASA has also named a Planck Project Manager at JPL who is responsible for the implementation of all NASA contributions to this mission.

Article 8 - Transfer of Goods and Technical Data

The Parties are obligated to transfer only those technical data (including software) and goods necessary to fulfill their respective responsibilities under this MOU, in accordance with the following provisions, notwithstanding any other provision of this MOU:

- 8.1 All activities of the Parties will be carried out in accordance with their national laws and regulations, including those relating to export control and the control of classified information.
- 8.2 The transfer of technical data for the purpose of discharging the Parties' responsibilities with regard to interface, integration, and safety shall normally be made without restriction, except as provided in 8.1 above.

8.3 All transfers of goods and proprietary or export-controlled technical data are subject to the following provisions. In the event a Party or its Related Entity (e.g.; contractor, subcontractor, grantee, cooperating entity) finds it necessary to transfer goods or to transfer proprietary or export-controlled technical data, for which protection is to be maintained, such goods shall be specifically identified and such proprietary or export-controlled technical data shall be marked. The identification for goods and the marking on proprietary or export-controlled technical data will indicate that the goods and proprietary or export-controlled technical data shall be used by the receiving Party or Related Entities only for the purposes of fulfilling the receiving Party's or Related Entity's responsibilities under this MOU, and that the identified goods and marked proprietary technical data or marked export-controlled technical data shall not be disclosed or retransferred to any other entity without the prior written permission of the furnishing Party or its Related Entity. The receiving Party or Related Entity shall abide by the terms of the notice and protect any such identified goods and marked proprietary technical data or marked export-controlled technical data from unauthorized use and disclosure. The Parties to this MOU will cause their Related Entities to be bound by the provisions of this article related to use, disclosure, and retransfer of goods and marked technical data through contractual mechanisms or equivalent measures.

8.4 All goods exchanged in the performance of this MOU shall be used by the receiving Party or Related Entity exclusively for the purposes of this MOU. Upon completion of the activities under this MOU, the receiving Party or Related Entity shall return or, at the request of the furnishing Party or its Related Entity, otherwise dispose of all goods and marked proprietary technical data or marked export-controlled technical data provided under this MOU, as directed by the furnishing Party or Related Entity.

Article 9 – Intellectual Property

9.1 For the purposes of this article, "Related Entity" includes but is not limited to contractors, subcontractors, grantees, or cooperating entities (or any lower tier contractor, subcontractor, grantee, or cooperating entities) of a Party.

9.2 a. Nothing in this MOU shall be construed as granting, either expressly or by implication, to the other Party any rights to, or interest in, any inventions or works of a Party or its Related Entities made prior to the entry into force of, or outside the scope of, this MOU, including any patents (or similar forms of protection in any country) corresponding to such inventions or any copyrights corresponding to such works.

b. Any rights to, or interest in, any invention or work made in the performance of this MOU solely by one Party or any of its Related Entities, including any patents (or similar forms of protection in any country) corresponding to such invention or any copyright corresponding to such work, shall be owned by such Party or Related Entity. Allocation of rights to, or interest in, such invention or work between such Party and its Related Entities shall be determined by applicable laws, rules, regulations, and contractual obligations.

- c. It is not anticipated that there will be any joint inventions made in the performance of this MOU. Nevertheless, in the event that an invention is jointly made by the Parties in the performance of this MOU, the Parties shall, in good faith, consult and agree within 30 calendar days as to: a) the allocation of rights to, or interest in, such joint invention, including any patents (or similar forms of protection in any country) corresponding to such joint invention; b) the responsibilities, costs, and actions to be taken to establish and maintain patents (or similar forms of protection in any country) for each such joint invention; and c) the terms and conditions of any license or other rights to be exchanged between the Parties or granted by one Party to the other Party.
- d. For any work jointly authored by the Parties, should the Parties decide to register the copyright in such work, they shall, in good faith, consult and agree as to the responsibilities, costs, and actions to be taken to register copyright protection (in any country).
- e. Subject to the provisions of Articles 8 and 10, each Party shall have an irrevocable, royalty-free right to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, and authorize others to do so on its behalf, any copyrighted work resulting from activities undertaken in the performance of this MOU for its own purposes, regardless of whether the work was created solely by, or on behalf of, that Party or jointly with the other Party, and without consulting with or accounting to the other Party.

Article 10 – Publication of Public Information and Results

- 10.1 The Parties retain the right to release public information regarding their own activities under this MOU. The Parties shall coordinate with each other in advance concerning releasing to the public any information that relates to the other Party's responsibilities or performance under this MOU. Full acknowledgement shall be made by both Parties of the role of the other Party in the Planck mission.
- 10.2 The Parties shall make the final results obtained from the Planck mission available to the general scientific community in accordance with provisions of the Planck Science Management Plan (ESA/SPC/(2004)10 and, in particular, with chapter 5.2 (Scientific Data Rights and Publication Data Policy).
- 10.3 The Parties acknowledge that the following data or information does not constitute public information and that such data or information shall not be included in any publication or presentation by a Party under this article without the other Party's prior written permission: 1) data furnished by the other Party in accordance with Article 8 of this MOU which is export-controlled, classified, or proprietary; or 2) information about an invention of the other Party before a patent application has been filed covering the same, or a decision not to file has been made.

Article 11 - Financial Arrangements

- 11.1 Each Party will bear the costs of discharging its respective responsibilities, including travel and subsistence of personnel and transportation of all equipment and other items for which it is responsible. Further, it is understood that the ability of the Parties to carry out their obligations is subject to the availability of appropriated funds. Should either Party encounter budgetary problems that may affect the activities to be carried out under this MOU, the Party encountering the problems will notify and consult with the other Party as soon as possible to minimize the negative impact of such problems on the cooperation.

Article 12 - Customs Clearance, Taxes, Immigration, and Ownership

- 12.1 In accordance with the laws and regulations governing the Parties, each Party shall facilitate free customs clearance and waiver of all applicable customs duties and taxes for equipment and related goods necessary for the implementation of this MOU. In the event that any customs duties or taxes of any kind are nonetheless levied on such equipment and related goods, such customs duties or taxes shall be borne by the Party of the country levying such customs duties or taxes. The Parties' obligation to facilitate duty-free entry and exit of equipment and related goods is fully reciprocal.
- 12.2 Subject to applicable laws and regulations, each Party shall facilitate provision of the appropriate entry and residence documentation for the other Party's personnel who enter, exit, or reside within its territory to carry out the activities under this MOU.
- 12.3 Equipment provided by ASI pursuant to this MOU will remain the property of ASI. Equipment provided by NASA pursuant to this MOU will remain the property of NASA.

Article 13 - Exchange of Technical Personnel

- 13.1 Each Party may temporarily locate a mutually agreed-upon number of its personnel at the other Party's respective facilities in the United States and Italy to participate in technical activities described in this MOU. Each Party shall provide workspace and necessary office equipment to accommodate the other Party's personnel that shall be temporarily located in the United States and Italy. Salary and all other personnel expenses, such as living and travel expenses, shall be borne by the employing Party of the technical representative(s) throughout the duration of their assignment. Arrangements for, and all conditions relating to, the personnel relationships shall be agreed to and jointly documented in writing between NASA and ASI. These personnel shall comply with the safety and security rules and regulations of the hosting Party.
- 13.2 NASA and ASI shall provide, on occasion and as appropriate, for personnel to visit each Agency's facilities to participate in integration and testing and to observe, confer, and advise the other Party regarding aspects of design and development of compatible instrument interfaces, integration, and testing.

Article 14 - Liability

14.1 The Parties agree that a comprehensive cross-waiver of liability among the Parties and their related entities will further participation in space exploration, use, and investment. The cross-waiver of liability shall be broadly construed to achieve this objective. The terms of the waiver are set out below.

14.2 The following terms, as used in this article, are defined below:

- a. The term "Party" has the meaning specified in the Preamble;
- b. The term "related entity" means:
 - (i) a contractor, subcontractor, or sponsored entity of a Party at any tier;
 - (ii) a user or customer of a Party at any tier;
 - (iii) a contractor or subcontractor of a user or customer or sponsored entity of a Party at any tier; or
 - (iv) scientific investigators.

The term "related entity" may also include another State or an agency or institution of another State, where such State, agency, or institution is an entity as described in (i) through (iv) above or is otherwise involved in the activities undertaken pursuant to this MOU.

The terms "contractors" and "subcontractors" include suppliers of any kind.

- c. The term "damage" means:
 - (i) bodily injury to, or other impairment of health of, or death of, any person;
 - (ii) damage to, loss of, or loss of use of any property;
 - (iii) loss of revenue or profits; or
 - (iv) other direct, indirect, or consequential damage.
- d. The term "launch vehicle" means an object or any part thereof intended for launch, launched from Earth, or returning to Earth that carries payloads or persons, or both;
- e. The term "payload" means all property to be flown or used on or in a launch vehicle; and
- f. The term "Protected Space Operations" means all activities pursuant to this MOU, including launch vehicle activities and payload activities on Earth, in outer space, or in transit between Earth and outer space. "Protected Space Operations" begin at the signature of this MOU and end when all activities done in implementation of this MOU are completed.

"Protected Space Operations" include, but are not limited to the following:

- (i) research, design, development, test, manufacture, assembly, integration, operation, or use of launch or transfer vehicles, payloads, or instruments, as well as related support equipment, facilities, and services; and
- (ii) all activities related to ground support, testing, training, simulation, or guidance and control equipment and related facilities or services.

The term "Protected Space Operations" excludes activities on Earth that are conducted on return from space to develop further a payload's product or process for use other than for the joint activity in question.

14.3. a. Each Party agrees to a cross-waiver of liability pursuant to which each Party waives all claims against any of the entities or persons listed in subparagraphs (i) through (iii) below based on damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. This cross-waiver shall apply to any claims for damage, whatever the legal basis for such claims, against:

- (i) the other Party;
- (ii) a related entity of the other Party; or
- (iii) the employees of any of the entities identified in subparagraphs (i) and (ii) immediately above.

b. In addition, each Party shall extend the cross-waiver of liability, as set forth in subparagraph 14.3.a above, to its own related entities by requiring them, by contract or otherwise, to agree to waive all claims against the entities or persons identified in subparagraphs 14.3.a (i) through 14.3.a (iii) above.

c. Notwithstanding the other provisions of this section, this cross-waiver of liability shall not be applicable to:

- (i) claims between a Party and its own related entity or between its own related entities;
- (ii) claims made by a natural person, his/her estate, survivors, or subrogees for bodily injury, other impairment of health, or death of such natural person, except where the subrogee is a Party to this MOU or has otherwise agreed to be bound by the terms of this cross-waiver;
- (iii) claims for damage caused by willful misconduct;
- (iv) intellectual property claims;
- (v) claims for damage resulting from a failure of a Party to extend the cross-waiver of liability, as set forth in subparagraph 14.3.b, or from a failure of a Party to ensure that their related entities extend the cross-waiver of liability, as set forth in subparagraph 14.3.b; or
- (vi) contract claims between the Parties based on the express contractual provisions.

- d. Nothing in this article shall be construed to create the basis for a claim or suit where none would otherwise exist.
- e. For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of liability arising from the 1972 Convention on International Liability for Damage Caused by Space Objects where the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.
- f. In the event of third-party claims for which the Parties may be liable, the Parties will consult promptly to determine an appropriate and equitable apportionment of any potential liability and on the defense of any such claims.

Article 15 - Registration of Space Objects

- 15.1 NASA and ASI acknowledge that ESA is entitled to register Planck as a space object in accordance with the 1975 Convention on Registration of Objects Launched into Outer Space (the Registration Convention). ESA shall retain jurisdiction and control over the space objects it registers.
- 15.2 Registration pursuant to this article shall not affect the rights or obligations of either Party or its Government under the 1972 Convention on International Liability for Damage Caused by Space Objects.

Article 16 - Mishap Investigation

- 16.1 In the case of a mishap or mission failure, the Parties agree to provide assistance to each other in the conduct of any investigation, bearing in mind, in particular, the provisions of Article 8 of this MOU. In the case of activities that might result in the death of or serious injury to persons, or substantial loss of or damage to property as a result of activities under this MOU, the Parties agree to establish a process for investigating any such mishap as part of their program/project implementation plans.

Article 17 - Amendment

- 17.1 This MOU may be amended or extended by written agreement of the Parties.

Article 18 - Consultation and Settlement of Disputes

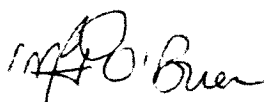
- 18.1 The Parties' respective points of contact, identified in Article 7.3 and 7.4, shall consult promptly with each other on all issues involving interpretation or implementation of this MOU. These points of contact will attempt to resolve all issues arising from the implementation of this MOU.
- 18.2 In the case of a question of interpretation or implementation of the terms of this MOU, such questions that cannot be resolved by the Parties' respective points of contact shall

be referred for joint resolution to the NASA Associate Administrator for Science Mission Directorate and to the ASI Director of the Observation of the Universe, or their designees; and if unresolved at this level, then to the NASA Administrator and the ASI President, or their designees, for joint resolution.

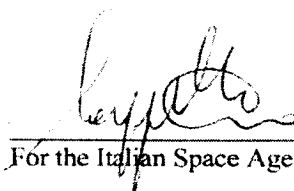
Article 19 - Entry into Force and Termination

- 19.1 This MOU shall enter into force upon signature by the Parties and the conclusion of an agreement to be effected by an exchange of diplomatic notes incorporating the terms and conditions of this MOU. This MOU shall remain in force until December 31, 2014, to permit completion of the Planck mission and data-analysis period. This MOU may be extended by mutual written agreement of the Parties, provided that the agreement effected by the exchange of notes remains in force. The interim agreement of March 29, 2001, shall terminate upon entry into force of this MOU.
- 19.2 Either Party may terminate this MOU at any time by giving the other Party at least six months written notice of its intent to terminate. Termination of this MOU shall not affect a Party's continuing obligations under Articles 6, Rights in and Distribution of Scientific Data; 8, Transfer of Goods and Technical Data; 9, Intellectual Property; 12, Customs Clearance, Taxes, Immigration, and Ownership; and 14, Liability, that shall continue to apply after the expiration or termination of this MOU. In the event of termination, the Parties shall endeavor to minimize the negative impacts of such termination on the other Party.

Done in duplicate in the English language.



For the National Aeronautics
and Space Administration of
the United States of America



For the Italian Space Agency

Date: January 26, 2009

Date: February 6th, 2009